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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/881,514	06/12/2001	Solomon I. Beilin	6136/53755 (25916-111)	8578

7590

09/24/2002

COUDERT BROTHERS
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EXAMINER

AHMED, SHAMIM

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 09/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/881,514

Applicant(s)

BEILIN ET AL.

Examiner

Shamim Ahmed

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 June 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 22-54 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 22-44 and 47-54 is/are rejected.
- 7) ☒ Claim(s) 45 and 46 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3. 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawing 18 is objected to as failing to comply with 37 CFR 1.84(p)(5) because it include the following reference sign(s) not mentioned in the description: In figure 18, the label "PI" is not identified in the specification. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claim 39 is objected to because of the following informalities: In the claim 39, line 6, the word "contracting" should be "contacting". Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 36-38 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 36, line 2 the negative limitation "not increasing the rate at which copper material is removed" is not properly described in the specification. The specification describes that the removal rates of copper in the silica slurry acidified by phosphoric acid remained unchanged (see page 15, lines 20-22).

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

6. Claims 22-28 and 53 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. Regarding claim 22, step (C), the phrase "polishing subsequently and simultaneously" renders the claim indefinite because it is unclear how the polishing of two layers is performed subsequently and simultaneously?

8. Regarding claim 53, the phrase "a slurry consisting of an abrasive and phosphoric acid" renders the claim indefinite because it is unclear how the slurry excludes other materials such as water because phosphoric acid contains water. ➡

REMARKS

The following rejection is based upon the polishing is performed simultaneously the material layer and the copper (claim 22) and the slurry comprises phosphoric acid and an abrasive (claim 53).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 22-44 and 47-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joshi et al (5,731,245) in view of Roberts (4,959,113).

As to claims 22,29,35,39-44,47-53, Joshi et al disclose a method for fabricating circuits, wherein copper (Cu) is capped with a refractory metal such as tungsten (W), which resembles the material layer (col.7, lines 35-43).

Joshi et al also disclose that a tungsten-germanium (W-Ge) alloy hard cap is deposited over the refractory metal and the metalization, wherein tungsten-germanium alloy layer is used as wear-resistant polish-stop in the chemical mechanical polishing process (col.8, lines 15-34). So, Joshi et al teach that the material layer and the copper are simultaneously polished until contacting the polish-stop layer.

Joshi et al fail to disclose that the polishing slurry comprises phosphoric acid.

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However, Roberts discloses a polishing composition comprises an abrasive agent and phosphoric for polishing metal surface such as copper, wherein phosphoric acid is beneficial to the polishing process by lowering the pH of the composition (col.1, line 66-col.2, line 5 and col.3, lines 63-68).

As to claims 25-26,32-33, and 37-38, Roberts also discloses that pH of the slurry is maintain in the range of about 1-6 (col.3, lines 63-col.4, line 2).

As to claims 23-24,30-31, Roberts teaches a concentration of the phosphoric acid but does not teach the exact concentration. However, it would have been obvious to one skilled in the art to find the optimum concentration by routine experimentation.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of claimed invention to combine Roberts's teaching into Joshi et al's method to enhance the polishing process as taught by Roberts.

As to claim 36, Joshi et al teach that the polish-stop layer is more resistant to the polishing slurry (col.8, lines 18-22). So, the polishing rate of the tungsten is decreased, while polishing the material layer and the copper.

As to claim 47, Joshi et al teach that the copper structure comprises a copper post (see figure 1A).

Allowable Subject Matter

12. Claims 45-46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

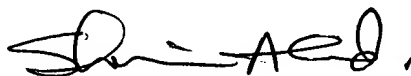
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13. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not teach a process for forming an polish-stop layer in such that a portion of the material layer and the copper extends above the polish-stop layer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (703) 305-1929. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703)-872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Shamim Ahmed
Examiner
Art Unit 1765

SA
September 19, 2002